

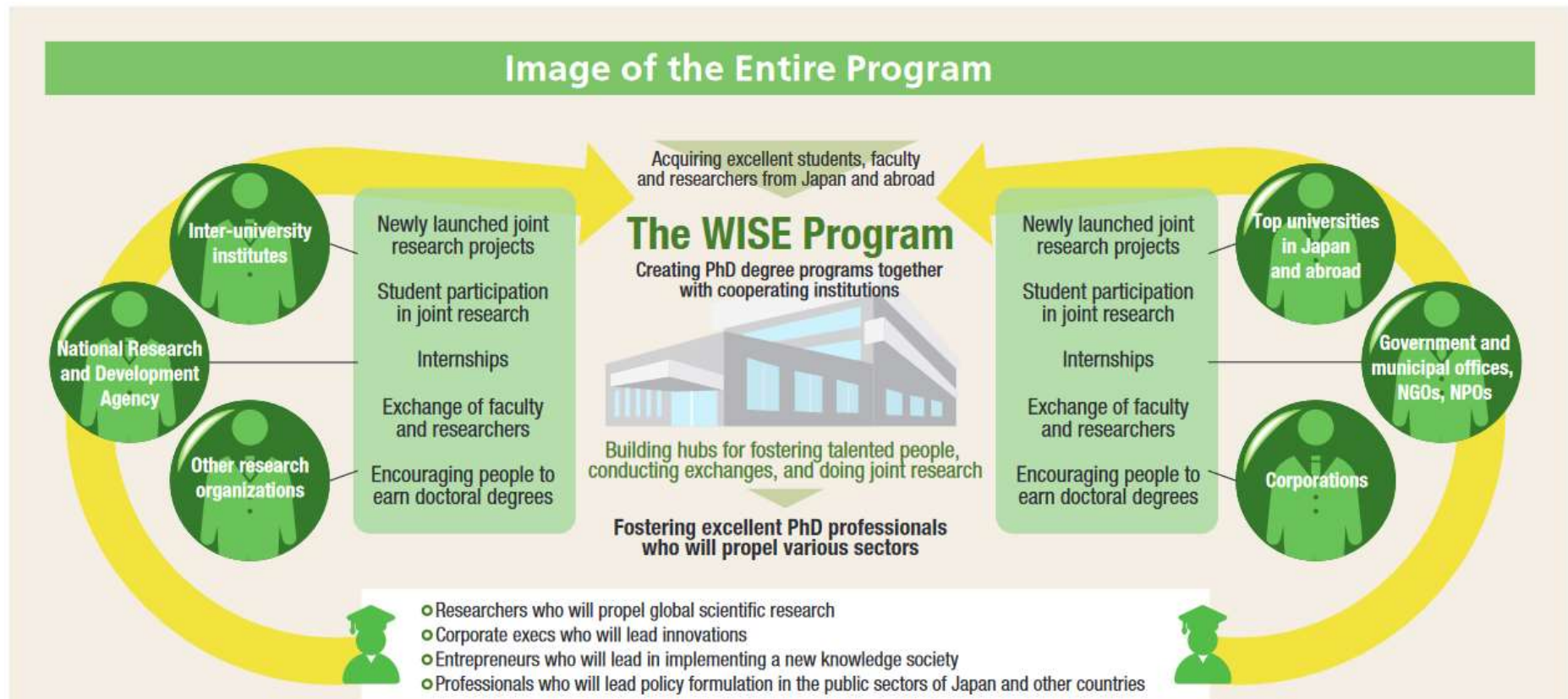


**Information session for Development of WISE Program to  
foster AI Professionals for Marine Industries  
April 2024 admission**



# WISE Program (Doctoral Program for World-leading Innovative & Smart Education)

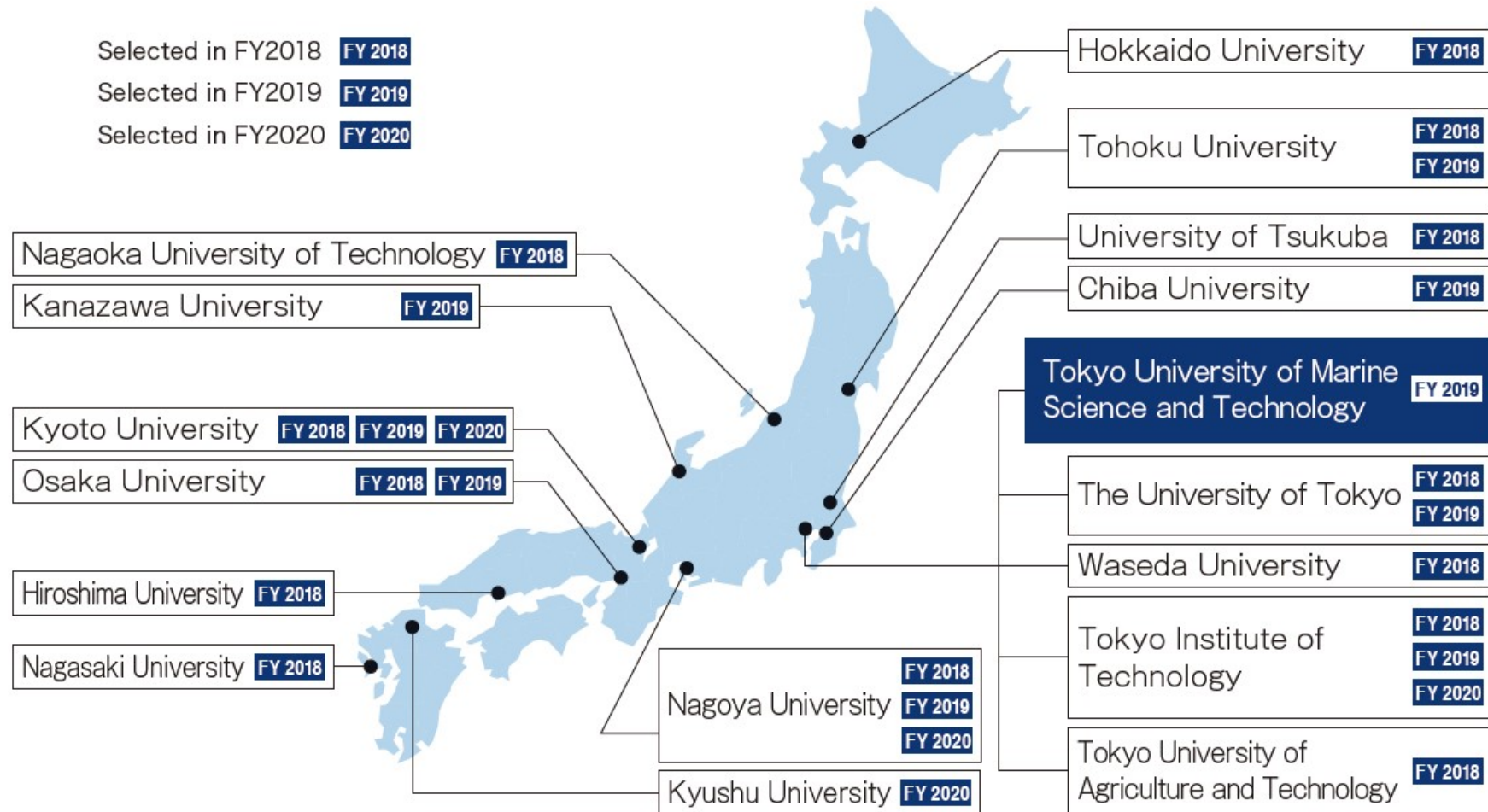
- Launched in FY 2018 by MEXT (the Ministry of Education, Culture, Sports, Science and Technology)
- Period of program support: 7 years
- Integrated master's-doctoral programs, which over a 5-year period endow their students with a melding of top world-class educational and research prowess
- To propel the establishment of excellent academic hubs capable of sustainably advancing human resource development and exchange and of generating new joint research initiatives



[https://www.jsps.go.jp/j-takuetsu-pro/data/WISEbrochure\\_en.pdf](https://www.jsps.go.jp/j-takuetsu-pro/data/WISEbrochure_en.pdf)

# List of programs selected

One of the only 30 programs selected in total.



2018: 13 universities, 15 programs

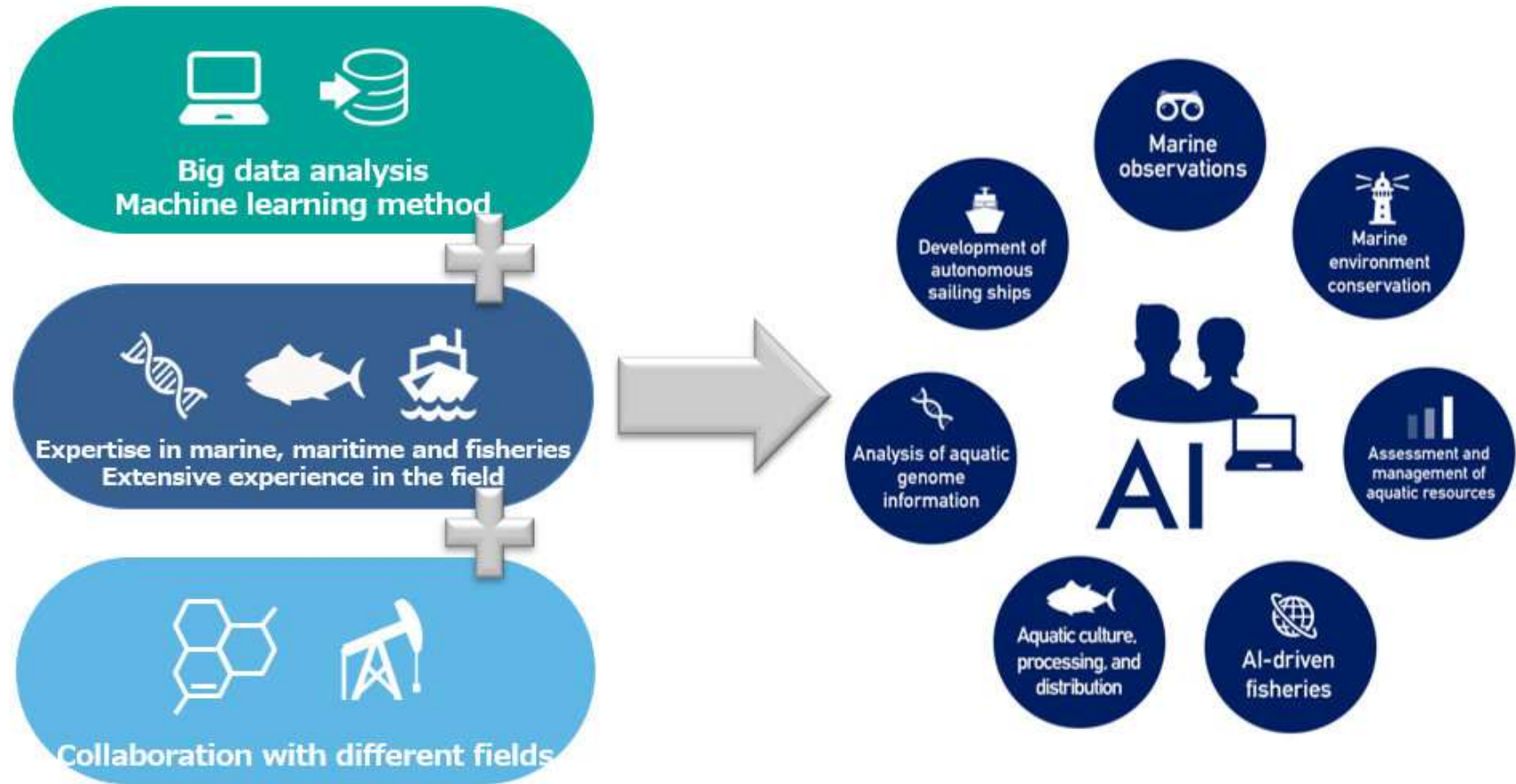
2019: 9 universities, 11 programs

2020: 4 universities, 4 programs



# Human resources development image

Areas of activity, creating value, solving problems of human society



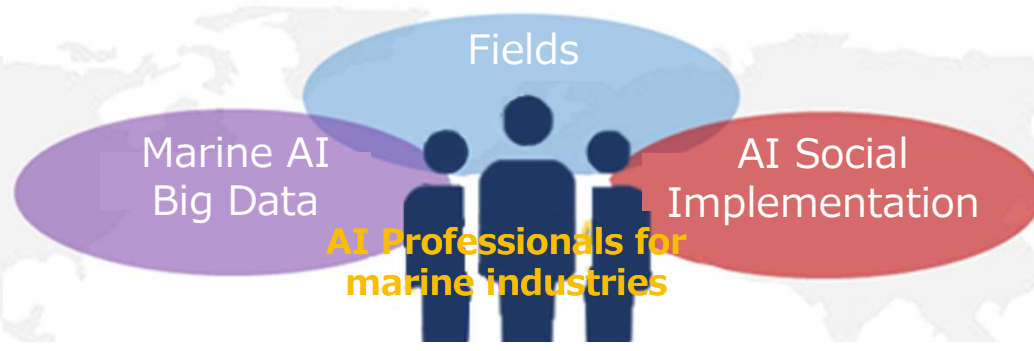
## AI Professionals for marine industries

Fostering highly specialized engineers who will lead the social implementation of marine-related AI and people who will conduct maritime policy based on AI.

# Education and research system to sustain excellence



Students from any department can participate in.



Various Supports  
(Mentor, Financial Assistance, Career Path Formation etc.)

Fishing, mining, transportation, information and communication, construction, manufacturing, pharmaceuticals, finance, insurance, consulting, public offices, research institutions

Doctoral dissertation defense + Program completion review

## 5-year integrated program, 2<sup>nd</sup> semester (3-5 years)

Max.15 students (10 advanced students + 5 working professional students) / year

- New 2 courses (Course on Advanced Reliability Assessments / Course on Social Implementation Impact Assessments)
- Specialized lectures on Artificial Intelligence
- Participation in actual projects at partner institutions

Course of Applied Marine Biosciences

Course of Applied Marine Environmental studies

Qualifying Examination + Selection for Financial Support of "Education and Research Support Expenses"

## 5-year integrated program, 1<sup>st</sup> semester (1-2 years)

Max.10 students / year

- Lectures and exercises on big data analysis and machine learning
- Specialized courses corresponding to the major field of study

Course of Marine Life Science

Course of Food Science and Technology

Course of Safety Management in Food Supply Chain

Course of Marine Resources and Environment

Course of Marine System Engineering

Course of Maritime Technology and Logistics

Course of Marine Policy and Management

Collaboration and field provision

Marine-AI consortium

Work

Doctoral program

Master's program

# Master's Program Curriculum

## Master's Program

Comparison with the number of credits required to complete the course

**15 credits of WISE Program courses**

- 14 of these credits can be used for completion of your own major (the actual increase is 1 credit)
- Courses may be taken by students not enrolled in WISE Program

Same as your own major

Master's program

	Course type	Course title (number of credits)	Required credits	
Required courses	Common courses* <sup>1</sup>	Artificial Intelligence and Machine Learning (2)	5	
		Deep Learning (2)		
		Exercise in Machine learning (1)		
	Topics in big data	Data Science (2)	5	
		Data Engineering (2)		
		Exercise in Data Science (1)		
	Interdisciplinary courses	Marine AI workshop (1)	1	
	Required electives	Specialization courses* <sup>2</sup>	Courses required by the program of each specialization (4)	4
	Required courses	Lecture, experiment, or practicum in the field of specialization		4
Special seminar of specialization			4	
Research of specialization or Research on specific topic in the field of specialization			8	
Total			31	

\*1 The course is offered as a common course for all graduate programs.

\*2 The course is determined by the field of specialization.

Total: 31 credits (the normal number of credits required for the Master's program plus 1 credit)

Substantial burden + 1 credit

# Doctoral program Curriculum

## Doctoral program

Comparison with the number of credits required to complete the course

**11 credits of WISE Program courses**

- 4 of these credits can be used for completion of your own major (the actual increase is 7 credit)
- Courses may be taken by students not enrolled in WISE Program

Same as your own major

Doctoral program

	Course type	Course title (number of credits)	Required credits
Required courses	Common courses*1		
	Topics in AI (machine learning)	<a href="#">Advanced Artificial Intelligence and Machine Learning</a> (2)	4
	Topics in big data	<a href="#">Social Implementation of Data Science</a> (2)	
	Interdisciplinary courses	<a href="#">Marine AI workshop 1</a>	1
Required electives	Specialization courses*2	Lecture in major or courses required by Exercises / experiments / practices	2
	Courses*3		
	Course on Advanced Reliability Assessments	<a href="#">Advanced Evaluation of Ship Navigation Safety</a> (2)	2
	Course on Social Implementation Impact Assessments	Interlaboratory Seminar in Social Implementation (2)	
	Marine AI Residency Program		2
Required courses	Advanced seminar of specialization		2
	Advanced Research of specialization		4
<b>Total</b>			<b>17</b>

\*1 The course is offered as a common course for all graduate programs.

\*2 The course is determined by supervisor.

\*3 Select either course when entering the second semester program.

Total: 17 credits (the normal number of credits required for the Doctoral program plus 7 credit)

Substantial burden + 7 credit

# New Course for Master's Programs Starts!

**Establishment of the “Marine AI Core Course” an on-campus course that enables students to systematically acquire knowledge of Marine x AI (from April 2023).**

## Course Features

- Capable of acquiring knowledge and credits in Marine x AI required by industries.
- Those who have earned at least 10 credits from the program’s common subjects and specialized subjects are certified as graduates of the “Marine AI Core Course”.
- The university will issue a certificate of completion and support career path formation.
- Transferable to WISE Program (program credits earned count toward requirements).
- Extensive interaction with companies and others through participation in workshops and study groups.
- Participation in program-specific internships available upon selection.

Master's program

	Course type	Course title (number of credits)	Required credits
Required courses	Common courses <sup>*1</sup>		
	Topics in AI (machine learning)	Artificial Intelligence and Machine Learning (2)	5
		Deep Learning (2)	
		Exercise in Machine learning (1)	
	Topics in big data	Data Science (2)	5
		Data Engineering (2)	
		Exercise in Data Science (1)	
Interdisciplinary courses	Marine AI workshop (1)	1	
Required electives	Specialization courses <sup>*2</sup>	Courses required by the program of each specialization (4)	4
Required courses		Lecture, experiment, or practicum in the field of specialization	4
		Special seminar of specialization	4
		Research of specialization or Research on specific topic in the field of specialization	8
Total			31

\*1 The course is offered as a common course for all graduate programs.

\*2 The course is determined by the field of specialization.

## Differences from WISE Program

<Advantages>

- Easy to start learning about Marine x AI .
- If motivation and interest in AI grows, earned credits can be used to transfer to WISE Program.

<Financial Support>

- Participation in WISE Program is required to receive full financial assistance.



## Research Assistant

Takuetsu-RA (Research Assistant) for research work that is expected to lead to useful experiences as a WISE program for master's and doctoral students of the program.

**Up to the equivalent of 50,000 yen per month is paid.**

\* Employment of research services must meet requirements and may require a separate review from participation in the program

\* Not applicable for Japanese Government Scholarship students (starting from April 2024).

\* Open to working students upon request.

## Other financial support for research

In addition to research expenses (100,000 yen per student per year), travel and participation expenses for participation in academic conferences and internships are provided.

## Education and research support expenses (benefit-type support expenses)

In order to concentrate on their studies, financial support for education/research expenses (up to 130,000 yen per month) will be provided for students Selected by QAU(Quality Assurance Unit) from students who have achieved excellent results in the examination conducted at the end of the master's program. Financial support will be paid to a maximum of five individuals during the doctoral course.

\*If fewer than 5 students from the Master's Course are eligible for the Education and Research Support Fund, those who advance from the "Marine AI Core Course" will be eligible to apply for the Education and Research Support Fund.

\*If you meet the requirements even if you are not eligible for the Education and Research Support Expenses in the doctoral course, 100,000 yen will be granted as RA.



## Marine AI Development and Evaluation Center (MAIDEC)

Education and research systems to accumulate and analyze various big data related to the marine industries, such as marine observation equipment and high-speed sequencers for genome analysis, along with the latest high-performance computers.

## Mentor system

- On-Campus Mentors : Supported by a multi-mentor system.
  - “Technical Mentors” (consultation and support on technical aspects of AI)
  - “Student Support Mentors” (consultation and support for career paths and student life)
  - “Career Path Support WG” (information sharing on career path construction)
- Off-Campus Mentors : Experts from partner institutions will serve as mentors for Doctoral students. Provide consultation on AI social implementation for marine issues and career paths.

## English training

As part of global human resource development, we are conducting English training for the purpose of acquiring logical conversation skills and practical meeting skills for M1~D1.

## Udemy

Udemy is an online learning platform that provides video learning services, and the program has a contract with Udemy for Business, which allows students to freely study about 5,000 courses. The content provided by Udemy is effective as pre-learning for program subjects and can also be used for learning English. You can take classes freely from home, so please take advantage of it. It is also used as a teaching material for the common courses of the doctoral program, "Advanced Artificial Intelligence and Machine Learning" and "Social Implementation of Data Science".

## Marine AI student study session

This is a study session aimed at sharing the latest knowledge about marine AI and programming skills by providing opportunities for students and faculty members to share information and receive follow-ups. Specifically, we will present and examine what we have studied and studied, deeply explore issues such as classes, and set themes for discussions. The target is volunteer students and faculty members who participate in the program, and it is held online once a week.

## Marine AI student study session Plus

As an extension of the "Marine AI Student Study Group," it is a forum for casual presentations and exchanges of opinions at the trial-and-error stage, while providing an opportunity for more active interaction by openly inviting researchers and developers from related industries and research institutions to participate.

## Internship / Resident ship

We provide internships (Master's program) and resident ships (Doctoral program) to gain insight into one's own research.

The following are examples of internship themes.

- Development of a Development of a Transport Simulator Using a Multi-Agent System
- Development of an automated system for Development work for an automated system for planktonic specimen inspection work
- AI development and data analysis related to ship DX
- Marine-related white paper analysis and policy analysis using text mining
- Development of coral reef health diagnostic technology using artificial coral reefs



# Marine AI Consortium as of December. 2023



## Partner institutes



Japan Agency for Marine-Earth Science and Technology (JAMSTEC)



Japan Fisheries Research and Education Agency



National Institute of Maritime, Port and Aviation Technology



IDEA Consultants, Inc. IDEA Consultants, Inc

**BEMAC** BEMAC Corporation



NPO Marine Technologist



Technical University of Denmark



Ocean Policy Research Institute (OPRI) of the Sasakawa Peace Foundation

## Cooperating institutes (order of participation)



Innoqua Inc.



Japan Weather Association



Nissui Corporation



Maruha Nichiro Corporation



FURUNO ELECTRIC CO.,LTD.



Japan Radio Co.,Ltd.



Monohakobi Technology Institute

MTI Co., Ltd.

# Internship and Resident ship with Marine AI Consortium

## 【Objective】

Learn about the social implementation of AI and gain insight into their own research theme.

In the "Resident ship (2 credits)" program for second-semester students, students will enhance their social implementation skills through long-term and advanced experiences of AI implementation in the real world, and develop outstanding hybrid human resources of marine and AI.



# Takuetsu-Internship Project results of dispatch projects in 2023



- ❑ Takuetsu-Internships will be offered in April and October, taking into consideration the AI course progress of M1 students, and matching them with projects.
- ❑ 17 candidate projects were received from 9 institutions participating in the consortium, and a total of 20 students participated in the projects from May.
- ❑ Takuetsu-Resident ship will be a long-term (6-10 months), paid employment contract (employment type, compensation, letter of commitment/NDA, etc. are subject to the host institution's rules and regulations). The recipient will also serve as an "off-campus mentor" during the Resident ship and (if mutually agreed upon) after completion of the Resident ship to answer questions and provide advice to the student.

receiving institution	Accepted projects, etc.	implementation period
Japan Agency for Marine-Earth Science and Technology (JAMSTEC)	Detection of marine organisms from underwater video using machine learning and image recognition	5/8~6/8
	Research and development on the application of image recognition AI to marine geoscience	7/11~8/5
	Detection and discrimination of microplastics using machine learning and image recognition	9/13~10/13
	Feeding behavior analysis of captive fish	9/25~10/31
Japan Fisheries Research and Education Agency	Research coverage of land-based cultivation of sea cucumbers and Tairagi (Momoshima Town Hall)	6/16~6/30
	Challenges of the Resource Assessment Model	8/1~8/14
	Research on safe operation of fishing vessels and formulation of research plans	8/14~9/8
IDEA Consultants, Inc.	DNA Analysis Experience	8/7~8/8
	Building a fish school model using AI technology	8/21~9/1
	Practical experience in environmental impact assessment for development projects on the seabed	10/2~10/6
NPO Marine Technologist	Bottleneck analysis of optimal voyage planning for ferries navigating the Seto Inland Sea (Weather Routing)	2022/11/9~
Ocean Policy Research Institute (OPRI) of the Sasakawa Peace Foundation	Clarifying the Gap between Machine Learning (AI) and Social Issues (tentative title)	11/20~12/1
Japan Weather Association	Improvement of wave prediction accuracy	6/1~8/31
Nissui Corporation	Research on automatic detection of XXX parasites in farmed Kampachi (partially masked)	7/24~10/24
FURUNO ELECTRIC CO.,LTD.	Research on ship navigation control algorithms using reinforcement learning	8/21~9/1, 9/4~9/15 (Resident ship)



## Comments from participating program students (excerpts)



...It was a good experience for me to dive into a different field, as it is my goal in the doctoral program to integrate my field and other fields in my future research.



...We were able to acquire the know-how necessary to actually deliver AI models to people around the world and have them use them, rather than ending up on a PC.



...I was able to experience deep learning frameworks that are not yet widely used in Japan and the latest efforts to improve the accuracy of models for my own research.

## Evaluation of consortium host institutions (excerpts)



...I was proactive in coming up with solutions to new problems, and the results were beneficial not only to my education, but also to the actual operations of my host institution.



...Discussions with employees about future business development possibilities were lively and very stimulating.



...The students were honest, humble, and active, and showed high performance in a short period of time, and the recipients were able to learn a lot from them.

⇒ In several cases, we have been offered to continue participating in the project as a paid, part-time employee after the internship ends.



Internship Completion Report(Web)

## Marine AI Workshop I · II

【Objective】 To deepen the students' bird's eye view of the marine field and to cultivate their ability to communicate in different fields.





□ In FY2022, more than three times as many students as in FY21 participated, and they actively exchanged opinions in face-to-face group discussions (4 out of 6 sessions). In the final session, a workshop was held in English with the participation of international students from the Japanese Government Scholarship Priority Program, where ideas were presented with an awareness of the differences among countries.

□ **In FY2023, 22 students from the program are scheduled to participate. In addition, 22 students from the Emergent Human Resources Development Project and the Japanese Government Scholarship Priority Program are scheduled to participate.**

	Course start date (4th and 5th period)	theme	Lecturer in charge	Location(*1)
1st	2023/7/6(Thu) 4th period	How to proceed with AI-related projects (lecture) Communication skills that AI engineers should acquire (lecture)	TUMSAT	Etchujima Multipurpose classroom
2nd	2023/7/6(Thu) 5th period	(first half 30 minutes) How to proceed with the workshop (lecture + demo) (Second half 60 min.) Shipping/Vessel Operations: Past, Present and Future (Lecture + QA)	TUMSAT NPO Marine Technologist	
3rd and 4th	2023/7/13(Thu)	Background and Issues of Disaster Transportation	National Institute of Maritime, Port and Aviation Technology	Etchujima Multipurpose classroom
5th and 6th	2023/9/7(Thu)	Generate ideas for AI technology and other technologies that can be used for biological and fisheries research in water bodies.	IDEA Consultants, Inc.	Shinagawa Bldg. 1, Room 14
7th and 8th	2023/9/14(Thu)	How AI can be used in understanding the current status and predicting the future of marine plastic pollution	JAMSTEC	Shinagawa Bldg. 1, Room 14
9th and 10th	2023/10/5(Thu)	How can we utilize genome information of aquatic organisms for the development of the fisheries industry?	Japan Fisheries Research and Education Agency	Shinagawa Bldg. 1, Room 14
11th and 12th	2023/10/12(Thu)	How AI and data analytics can be used to solve maritime industry challenges	BEMAC Corporation	Etchujima Multipurpose classroom
13th and 14th	2023/10/19(Thu) (Co-sponsored with the Japanese Government Scholarship Priority Placement Program)	About Marine Policy (TBA)	OPRI of the Sasakawa Peace Foundation	Shinagawa Bldg. 1, Room 14
15th	2023/10/26(Thu) 4th period	Summary and Review	Facilitator: TUMSAT	Rental cafe (planned)
get together	2023/10/26(Thu) 5th period	Messages to students from each institution (expectations for those who have completed the 5-year doctoral program) (15 minutes/agency)	Participants: All lecturers, all course students	

## ❑ Comments from participating program students (excerpts)

…It was refreshing to see a different way of using one's head from one's own field of expertise. It was shocking to link policy to AI.

…I learned the importance of communication to find areas for improvement without denying each other.

…People think that a marine college graduate knows everything about the ocean. It's cool if you can talk about something other than your own specialty.



## ❑ Comments from the lecturers in charge of each session from the consortium (excerpts)

… The ability to think collaboratively with others about an issue is increasingly required. I wish I had such a class when I was a student.

…The ability to discuss with colleagues in different fields and communicate one's intentions and understand others is important in an organization.

…In order to implement this in society, it is necessary to tackle issues from a broad knowledge of not only technology, but also policy, economics, psychology of human behavior, geography and history of each country, and I was impressed by the classes that allowed us to do so.



# Marine AI Matching Week to be held (March-May 2023)



- Opportunities to build long-term relationships between matched program students and companies and institutions, leading to acceptance into internships and residencies, and even future career paths.

## Dispelling the fears and meeting the expectations of doctoral students

- Concerns about what the end of the doctoral program (career path) will look like 5 years from now
  - Direct and extensive contact between students and society.
  - Learn about the wide range of needs of the marine industry and make more obvious the significance of your research (e.g., companies that can actually use it in the future).
  - Expanding opportunities to showcase your abilities
  - Creation of internship/residency (real-world experience) opportunities (to build long-term relationships and lead to employment after completion of the program).

## Comments from the Marine Industry (Expectations for this event)

- Industry expertise & approach to AI engineers
- Can be connected to an internship/resident ship (Approach to better matched PhD personnel)
- Mutual compatibility can be confirmed on site. (can increase the degree of matching)
- To connect technical consultation and joint research through students in order to solve problems in the field.
- This will lead to the creation of role models for the utilization of PhDs.

The poster for Marine-AI Matching Week FY2022 features a central graphic of two interlocking puzzle pieces. The left piece is labeled 'WISE Program Students' and the right piece is labeled 'Marine Industry'. Between them is a circle containing the text 'The Bridge between WISE Program Students and Marine Industry'. Below this graphic are three session cards: '1st Session: Place of introducing each other (WISE Program Student and Marine Industry) Mar. 6, 2023-Mar. 10, 2023'; '2nd Session: QA Session by Marine Industry Mar. 9, 2023-Mar. 10, 2023'; and '3rd Session: 1 on 1 Meeting (WISE Program Student and Marine Industry) Individual adjustment'. At the bottom, a list of participating institutions is provided, including the Japan Agency for Marine-Earth Science and Technology, NPO Marine Technologist, and Maruha Nichiro Corporation. The Marine AI logo and contact information are at the very bottom.

Twenty-one doctoral students and 13 companies and institutions participating in the consortium participated. Twenty pairs were matched and have been participating in internships since May.



# Recruitment for April 2024

(Students enrolled in the **master's course** in 2024, 2023)



## Number of applicants

- About 10 people (2024) , Some people (2023)

## Qualification requirements

One of the following requirements ①~③ and ④ must be met. In case of ③, the requirement of ⑤ must also be met.

- ① Those who enrolled in the first year of the master's program at our graduate school in April 2024. \*
- ② Those who enrolled in the first year of the master's program at our graduate school in October 2023.
- ③ Those who entered the first year of the Master's Program of the Graduate School of the University of Tokyo in April 2023.
- ④ Those who are willing to continue on to the doctoral program of the University after obtaining a master's degree and have goals that match the educational and research principles of this program.
- ⑤ Those who have completed at least one of the WISE Program Common subjects "Artificial Intelligence and Machine Learning", "Deep Learning", "Data Science ", and " Data Engineering " by March 31, 2024 (Including estimates)

\*If you have applied for admission selection, you can apply even before the announcement of acceptance.

## Selection criteria

- First selection: document screening

Screening will be conducted based on Transcript of the final school, motivation for the application, and research plan in a comprehensive manner.

- Second selection: interview screening

The interview screening includes a presentation regarding the contents of the submitted research plan (5 minutes) and a subsequent question and answer session (total 15 minutes). The sessions evaluate applicants in a comprehensive manner based on their academic abilities, research skills, and understanding about and motivation for the Program.

**Applications will be accepted from January 12, 2024**  
**Please refer to the Application Information for details**



# Recruitment for April 2024

(Students enrolled in the **doctoral course** in 2024, 2023)



## Number of applicants

- About 5 people (2024), Some people (2023)

## Qualification requirements

Any of the following ①~③ and ④~⑦ must be satisfied.

- ① Those who plan to enroll in the first year of the doctoral course (doctoral course) of the graduate school of the University in April 2024. \*
- ② Those who entered the first year of the doctoral course (doctoral course) of the graduate school of the University in October 2023.
- ③ Those who entered the first year of the doctoral course (doctoral course) of the graduate school of the University in April 2023.
- ④ The application must be made by “The special admission for full-time employees”
- ⑤ Must have worked for at least two years as a regular employee of a company, etc.
- ⑥ Must have research results or expertise level knowledge in AI and data science.
- ⑦ Those who understand the purpose of this program and are willing to complete the program in three years at the doctoral level.

\*If you have applied for admission selection, you can apply even before the announcement of acceptance.

## Selection criteria

- First selection: document screening  
Screening will be conducted based on Transcript of the final school, motivation for the application, and research plan in a comprehensive manner.
- Second selection: interview screening  
The interview screening includes a presentation regarding the contents of the submitted research plan (10 minutes) and a subsequent question and answer session (total 20 minutes). The sessions evaluate applicants in a comprehensive manner based on their academic abilities, research skills, and understanding about and motivation for the Program.

**Applications will be accepted from January 12, 2024**  
**Please refer to the Application Information for details**

## Number of applicants

- Some people

New!!

## Qualification requirements

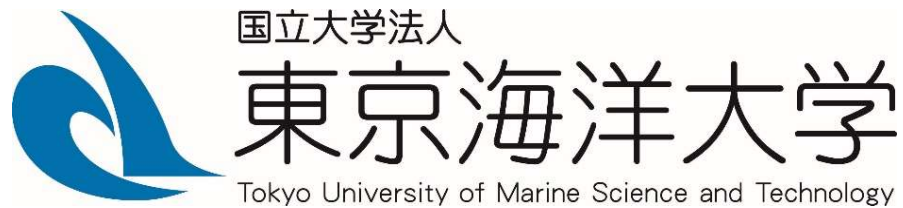
Satisfy the following ①~④.

- ① Those who are scheduled to enroll in the first year of the doctoral program at our graduate school in April 2024.  
\* If the applicant have applied for the selection of students for the doctoral course
- ② Those who must meet the requirements for completion of the "Marine AI Core Course".
- ③ Those who must be able to clearly demonstrate the ability to apply AI and data science to the field of specialization in the doctoral program (a master's thesis on AI and data science is even more desirable).
- ④ Those who are willing to complete the doctoral program in 3 years and have goals that match the educational and research principles of this program.

## Selection criteria

- First selection: document screening  
Screening will be conducted based on Transcript of the final school, motivation for the application, and research plan in a comprehensive manner.
- Second selection: interview screening  
The interview screening includes a presentation regarding the contents of the submitted research plan (20 minutes) and a subsequent question and answer session (total 30 minutes). The sessions evaluate applicants in a comprehensive manner based on their academic abilities, research skills, and understanding about and motivation for the Program.

**Applications will be accepted from January 12, 2024**  
**Please refer to the Application Information for details**



# 海洋産業AIプロフェッショナル育成卓越大学院プログラム Development of WISE Program to foster AI Professionals for Marine Industries

Academic affairs division, TUMSAT

- E-mail : [marine-ai\\_office@o.kaiyodai.ac.jp](mailto:marine-ai_office@o.kaiyodai.ac.jp)
- H P : <https://www.g2.kaiyodai.ac.jp/marine-ai/>